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Human factors in the development and transfer of improved aquaculture technology

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With a view of ensuring an adequate supply of fry and thereby enhancing sustainability of aquaculture, many agencies here and abroad have undertaken researches on captive breeding and mass fry production of various species. But there remain obstacles -- technical, market, and institutional -- which make the broodstock-hatchery technology quite risky to adopt.

The moral of this situation appears to be that technological change cannot take place in a "cultural vacuum." Success in the development and transfer of improved aquaculture technology will often be determined by how well technology designers have taken into account the social and behavioral context in which the technology will be applied. This insight is not new. Fishery biological scientists generally recognize the fact that new technology must be socially and economically relevant, but the 20-20 hindsight of social scientists has left them skeptical. Biological scientists view social scientists as after-the-fact critics who study and report cases where technology designers have gone wrong in social, cultural, or economic terms. The description and explanation of events that are over and done with is important. But knowledge of social dynamics is not very relevant unless it plays a crucial role during technology development stages.



SEAFDEC/AQD's demonstration complex for fish hatchery technologies: convincing farmers of technical viability

Choice and design of technology

The international research centers are now fully aware of the importance of considering "appropriate" technologies.¹ But what may appear appropriate from a scientist's viewpoint may not necessarily appear so to the target user. When the user's viewpoint is not known to, or considered by, the project designer, the project is vulnerable to the risk that the intended beneficiaries

may end up not using its services or technologies. In cases where the technical aspects of such technologies are not very complicated, it is often a range of user-related issues that need most attention during design—for example, the beneficiaries' access to time, money, land, or other indispensable resources, or the existence of undesirable practices, beliefs, or similar obstacles. In particular, project designers should focus on users rather than on technological inputs alone; consider what other technologies, skills, behavior patterns, or resources exist or are required to ensure that access to technology will be followed by its actual use; and adapt the technology to the user characteristics and build education components or incentives into the project.

Choosing a socially appropriate technology therefore requires three steps: (1) specify the social, behavioral, and resource requirements of the technology; (2) assess the corresponding characteristics of the target beneficiaries and their environment; and (3) compare both types of information to verify that the technology and the target users are compatible.

¹ This section draws on Perret and Lethem (1980)

Such cross-checking can be especially helpful not only in defining and ensuring the user's willingness to pay, but also in choosing among different technological options, in deciding location questions, and in identifying areas for cutting technology costs and small details that need to be altered to improve acceptance or use.

A close linkage between technology decisions and social information requires a timely and ongoing dialogue between technical, economics and social specialists, or access to technical specialists who are intimately familiar with relevant social aspects of the problem. Frequently, however, the social side of project work has continued in isolation from project technology decision-making.

Role of social scientists

Social scientists are examples of what has been called "liminal personae" -- they are "betwixt and between"—coming from the society and culture of scientists but often identifying with or focusing on the needs and goals of those they study. The role of the social scientists in technology development settings is to act as a *cultural broker* between farmers and technology designers. This is made most clear in the work of Rhoades and Booth (1982) who illustrated the means by which "acceptable agricultural technology" can be generated. In their farmer-back-to-farmer model, social scientists gain understanding of the farmer's perspective and needs, then communicate these to scientists who use the findings to design better, more appropriate technology. Under ideal circumstances, the technology is tested and adapted on-farm. Social scientists observe the reactions of farmers and communicate these evaluations back to the research scientists at which point the cycle can begin again.

In the implementation of the farmer-back-to-farmer model, social science provides an important service to both the farmer and the scientist by brokering the communication between them. This service-oriented research, however, is only part of what social science has to offer. There is a need for involvement of the social sciences, not only as a service-oriented appendage of biological research programs, but as leaders in the identification of technologies and policies that will help implement positive programs and to mitigate some of the potential negative consequences of the spread of new technology. This involvement comes under the rubric of what De Walt (1988:345) calls social science of agriculture... "the study of interaction of the natural environment, sociocultural patterns, market conditions, government policy, and

technological systems in order to identify agricultural research and/or extension priorities, to determine appropriate institutional structures and responsibilities for research and extension, to predict economic, social, and cultural consequences of agricultural change, and to identify government, agency and institutional policies that will facilitate development of more just and equitable social systems."

Things to do

The factors relating directly to the fish farmer, his family, and his community must be considered if the full effects of aquaculture research are to be realized. In particular, there is a need to document cases showing the strengths and weaknesses of social sciences for interdisciplinary work in developing fish production technology and then to establish a framework for generating more effective and creative interactions between social scientists and fishery biological scientists.

Social scientists often express hurt and disappointment when their expertise and efforts are not given due recognition. Their task, they tell each other, is huge, diffuse, and complex; those who fail to appreciate their work must lack the ability to see that complexity. What they don't say is that their unwillingness or inability to argue their case clearly has sown the seed of misunderstanding. Social scientists need to be able to speak the language of both the scientists and the people on whom development efforts are focused.

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